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ABSTRACT

The present study chose as its focus one of the primary reasons of why aptitude-treatment interactions (ATI) are difficult to find: methodological problems in the measurement of aptitude itself. The aptitude selected for this study is sensory modality preferences. Three types of modality data were gathered: norm-referenced (Illinois Test of Psycholinguistic Abilities), criterion-referenced (Individual Achievement Monitoring system), and teacher ratings. Use of the modality data was made under two different interpretations: forced decisions and nonforced decisions. A total of 21 variables were generated under these two interpretative conditions. A Campbell-Fiske convergent-discriminant intercorrelation matrix was formed. The first major question asked of the data was whether the commonly used, task-general ITPA modality assessments relate logically to the task-specific IAMS assessments. The second was whether the forced interpretation is compatible with the nonforced. (Author/CK)

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(ABSTRACT)

APTITUDE-TREATMENT INTERACTIONS WITH HANDICAPPED CHILDREN: A FOCUS ON THE MEASUREMENT OF THE APTITUDE COMPONENT

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Many aptitude-treatment interaction (ATI) studies have either reviewed studies with a view in mind of why ATI has generally failed to materialize, or they have new attempts (again, usually futile) to achieve ATIs. The present study chose as its focus one of the primary reasons of why ATIs are difficult to find: methodological problems in the measurement of aptitude itself. The aptitude selected for the present study is sensory modality preferences (e.g., auditory/vocal vs. visual/motor). Three types of modality data were gathered: norm-referenced (Illinois Test of Psycholinguistic Abilities), criterion-referenced (Individual Achievement Monitoring System), and teacher ratings. Use of the modality data was made under two different interpretations: forced decisions where a child is classified as an auditory or visual learner, and nonforced decisions where a child's different modality behaviors are considered in-

dependent of one another and not necessarily part of the same continuum. There were a total of 21 variables generated under these two interpretative conditions. A Campbell-Fiske convergent-discriminant intercorrelation matrix was formed. The first major question asked of the data was whether the commonly used, task-general ITPA modality assessments relate logically to the task-specific IAMS assessments. The second major question was whether the forced modality interpretation is compatible with the non-forced, independent modality interpretations.

(FULL PAPER)

APTITUDE-TREATMENT INTERACTIONS WITH HANDICAPPED CHILDREN: A FOCUS ON THE MEASUREMENT OF THE APTITUDE COMPONENT[1]

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INTRODUCTION

Much has been written on the search for aptitude-treatment interactions (ATI) in education. In what has now become a classic introductory review of early ATI studies, Bracht (1970) examined the ATI issue in detail. More recently, Salomon (1972) and Goldberg (1972) have raised additional cogent points about ATI. Finally, Ysseldyke (1973) surveyed ATI studies that have occurred in differential programing attempts with the handicapped. While there are a number of reasons of why ATI will or will not occur, as discussed in the general writings just mentioned, the present study has actively pursued one possible reason: methodological problems in the measurement of aptitude itself.

RELATED LITERATURE

While the reviews of Bracht (1970) and Salomon (1972) have been widely

acknowledged, some general conceptual issues from those two reviews should be mentioned here. In Bracht's survey of the ATI field, he found only 5 out of 90 studies that he would consider adequate evidence for supporting attempts to build instructional treatments differentially according to learner aptitudes. The criterion, however, that the 5 studies had to meet was quite stringent: "Bracht and Glass (1968) recently modified Lubin's distinction by specifying that an interaction effect is operationally defined as disordinal only when the differences between alternative treatments at two levels of a personological variable are both significantly nonzero and different in algebraic sign [p. 632]." Thus, while 5 out of 90 studies is pathetically weak support of the ATI philosophy, it must still be questioned whether disordinal (crossover) interactions in graphical form which possess a significant treatment difference only at one of the two levels of aptitude, do not also indicate at least a partially successful ATI study. Some of the main considerations in classifying the 90 ATI studies into meaningful subcategories that Bracht used are: (a) controlled or uncontrolled treatment tasks, (b) factorially simple or complex personological (aptitude) variable, and (c) specific or general dependent variable. It should be noted that individualization in the ATI sense is not true individualization of instruction on the classic 1-to-1 basis. The measurement of individualization's success in the ATI sense is really an assessment of small-group "individualization."

Salomon (1972) has added refinements to the conceptualization of ATI, mainly from an applied viewpoint. He divides ATI studies into remedial, compensatory, or preferential. The remedial approach is the most commonly used ATI variation. "Some critical ingredient of knowledge is deficient or missing, and no progress in learning can be expected unless the deficiency is overcome

[p. 329]." Salomon suggests that the only efficient way to obtain ATI's with the remedial approach is to have aptitude measures of highly specific nature. (This, of course, has direct implications for the use of the ITPA as a measure of sensory intactness.) He also suggests that there will rarely be remedial treatments that can be considered substantively different in terms of ATI studies: "For all practical purposes, instructional treatments will differ from each other only in terms of time, specificity, repetitions, and so forth, but not in terms of modalities, content structure, or method of presentation [p. 330]." Thus, there is little remedial work that an ATI framework is appropriate for.

Salomon's second model, the compensation approach, does not attempt to overcome a learner's deficiencies (as in the remedial model) but rather tries only to avoid their detrimental effects. In the third model, the preferential approach, one does not try to make up for a learner's deficiencies nor to avoid them, but instead designs treatments for the learner's strengths.

THE PROBLEM

Regardless of which of the 3 Salomon (1972) ATI categories one is interested in, researchers and programing specialists who deal with mentally handicapped children are continuously worried about what sensory modalities are used to convey instructional content. For some children, auditory-vocal types of functioning are more conducive to learning academic content, while for others visual-motor channels of communication are most effective. A number of ATI studies have built their treatments to reflect differences in sensory modality aptitudes of children. Because modality research is so prevalent in remedial instruction, the present study attempts to examine aptitude measurement problems in ATI modality research. In particular, the study assesses the appropriateness of usage of the Illinois Test of Psycholinguistic Abilities

(Kirk, McCarthy, & Kirk, 1968) in modality studies. Because the criteria of success of treatments used in ATI studies will often revolve around realistic classroom academic exercises, it is questionable to what extent the nonclassroom oriented, abstract tasks of the ITPA subtests are task-specific enough to form ATI's. To examine this issue, the present study was fortunate enough to have pretest classificatory data from the ITPA, as well as modality validity data from an extensive criterion-referenced testing battery used during a regular academic year.

Apart from the question of the ITPA's appropriateness for ATI research on sensory modality-oriented treatments, the present study examined a second issue. One of the major problems in attempting to individualize instruction by means of modality assessment is whether or not the many modality combinations should be considered part of <u>one</u> continuum or are actually <u>many</u> separate continua. If one chose the former view, he might try to gather several measures of visual-motor type and several of auditory-vocal type and then make <u>one</u> final decision as to whether the child is an audile learner or a visuile learner. However, in "forcing" a discontinuous data decision from continuous variables, one loses a great deal of specific information; There is an obliteration or "washing-out" effect of this subjective averaging. The present study investigates the implications of making modality decisions in both the single- or multi-continuum fashions.

PROCEDURE

<u>Measures</u>: Five selected subtests of the ITPA were used to make modality decisions ("aptitude" assessments). The subtests for the separate modality assessment approach are presented in Table 1. To gain validity information

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Insert Table 1 about here

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of an external type, specially devised criterion-referenced measurement (CRM) tests were made that reflect very specific tasks in the reading process (because of the presumed psycholinguistic/language orientation of the ITPA, the series of CRM reading tests were thought to be an appropriate task-specific aptitude measure in comparison to the task-general ITPA aptitude measure). There are 9 possible CRM modality reading measures formed as a composite from the 43 separate CRM tests that were given. Table 1 also contains these 9 measures.[2] Further, besides ITPA and CRM data, there are separate teacher ratings (from 1 to 5) for the oral response continuum ("how much difficulty does the pupil have responding orally," with 5 being "very much difficulty") and the written response continuum ("how much difficulty does the pupil have responding in writing," with 5 being "very much difficulty")

Apart from the separate continua perspective on modality assessment, this study also examined the issue of forced labeling decisions ("this child is basically an audile learner") by combining subjectively the data from several continua. The manner in which the separate criteria were combined is given in Table 2. ITPA-A embodies the forced learning preference between auditory re-

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Insert Table 2 about here

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ception and visual reception. ITPA-B pits auditory association against visual association. IAMS-A emphasizes the preference for auditory reception or visual reception, when the expressive mode in both cases is general vocal or general motor. IAMS-B focuses on a specific vocal expressive mode versus a specific written response, when all types of receptive modes are used in either expressive mode. The teacher rating TR-3 already embodied a forced choice and is distinct from TR-1 and TR-2 in Table 1. Tr-3 asked the teacher to "indicate

the mode of stimulus input that is most efficient with this child," with 1 being "distictly better with oral presentation" and 5 being "distinctly better with visual presentation."

Test Administration: All data have been obtained from the first operational year (1971-1972) of the Individual Achievement Monitoring System (IAMS) project, which is being field-tested in selected classes of the National Regional Resource Center of Pennsylvania. The Individual Achievement Monitoring System (IAMS) is an easily used classroom management system which directs and individualizes instructional programing. It is a classroom management structure designed to continuously assess in a CRM way the academic progress of handicapped children by use of specific behavioral objectives. It is predicated on the assumption that when academic performance is monitored at regular intervals, the teaching/learning process operates at its maximum efficiency. The IAMS consists of three basic component: (a) a series of easily understood curriculum-embedded behavioral objectives that map out the instructional program for any given subject-content area, (b) a series of tests that parallel the objectives, and (c) specific, commercially available programs in the subject-content area of interest. The teacher uses the instructional objectives to map out her instructional program on a day-to-day basis. The tests provide the teacher a ready assessment of student achievement with respect to the objectives at any point in time. Both the objectives and tests of the IAMS are referenced and coded directly with the commercial instructional programs being used so that precise and systematic teaching results can be obtained. In short, IAMS attempts to individualize instruction through individual CRM testing. A detailed description of the general IAMS concept and the related CRM literature is contained in Proger and Mann (1973).

The 5 selected subtests of the 1968 edition of the Illinois Test of Psycholinguistic Abilities given in Table 1 were given in fall, 1971, as part of an extensive standardized battery of pretests to 29 children of normal intelligence but with severe learning problems (classified as "learning disabled"). All children were enrolled in 3 self-contained classes in suburban school districts of the Greater Philadelphia Area. Each class had a maximum size of 10. All children were of approximately second grade chronological age.

The 9 CRM modality scores given in Table 1 are composites of items across 43 separate, individually administered CRM reading tests of the IAMS. The items (scored right or wrong) of the 43 tests were classified according to the 9 CRM modality areas, and 9 composite scores were thus generated for each of the 29 pupils in this study.

Analytical Design: This study attempts to assess the consistency with which the commonly used ITPA subtests measure modality preferences for school work. If the ITPA is to be used as a measure of modality aptitude in ATI research aimed at academic remediation and/or instruction, it must possess convergent validity in terms of the same modalities it measures as reflected in on-going schoolwork. It must be remembered that the ITPA has attempted to assess modality strengths and weaknesses without introducing the confounding in the test items of the difficulties a child might have in the specific areas of reading and arithmetic; that is, the ITPA tries to answer the question of whether or not a child has auditory-vocal or visual-motor difficulties in his central processing abilities apart from the child's observed difficulties in reading and arithmetic, which may or may not be the result of his modality problems. The problem, of course, is that in ATI re-

search one is interested in the reading and arithmetic difficulties and, as Bracht (1969) has suggested, one wants to use observation of a child's specific academic difficulties so as to maximize the construction of treatments that capitalize upon a child's known aptitudes. Highly specific, factorially simple aptitude measures should be facilitative to ATI results in this regard.

This study attempts to test how well the task-general ITPA modality assessments relate to the task-specific reading skills reflected in the IAMS composites. In general, the methodology employed here is the convergent-discriminant validity of Campbell and Fiske (1959). (The application of the Campbell-Fiske model to the ITPA has already been discussed in detail; see Proger, Cross, & Burger, 1973.). A matrix of Pearsonian intercorrelations is generated for similar measures (here, like modalities) and dissimiiar ones (here, unlike modalities). In this study, the Campbell-Fiske matrix contains three basic types of data: standardized ITPA subtests, criterion-referenced IAMS composite scores, and teacher ratings. Further, the scores from this triple set of data is used under 2 conditions: separate continua and combined continua. Under the condition of separate continua, the raw scores of the ITPA are used, while in the forced-choice, combined-continua situation, scaled scores are used so as to permit the ipsative interpretations to be made; under the latter condition, auditory preferences are always scored "0" and visual preferences, "1". For the IAMS data under the separate continua condition, each pupil had a score calculated in terms of percent correct out of total attempted, on each of the 9 modality assessments; for the forced-choice condition, new percentages were calculated for the combined modality conditions and an ipsative decision was now made

("0" was assigned if the child's preference was vocal response or auditory input, and "1" if written response or visual input). Raw scores were used for teacher ratings under either condition, as described above in connection with Table 2.

RESULTS

Table 3 contains the Campbell-Fiske matrix that is directed toward the major purposes of this study. The matrix has the intercorrelations of 21

Insert Table 3 about here

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variables. The first 16 variables represent the separate continua philosophy of modality assessment, and the second 5 variables embody the combined-continua, forced-choice modality assessment.

To answer the first main question of this study, namely, do the ITPA task-general modality assessments relate logically to the task-specific modality assessments of ongoing school achievement (as represented by the IAMS variables), one must focus attention on the intercorrelations for variables 1-16. In terms of "logical" expectations under the convergent-discriminant philosophy of the Campbell-Fiske model, one would hope that the like-modality measures "converge" (have high intercorrelations) and that the dissimilar modality measures "diverge" (have low intercorrelations). From Table 3, one sees that for the ITPA subtests taken as a group, this simply is not the case. Inspection of the intercorrelations between each pair of the ITPA subtest raw scores (variables 1 to 5) reveals that these coefficients are by far the highest in Table 3. The magnitude of these intercorrelations argues against the idea of assessment of distinct modalities with the ITPA. Whereas it might logically be expected that auditory subtests would correlate more positively

with each other than with the subtests that measure visual modalities, this is not generally the case. For example, the highest correlation in this submatrix is .884 between visual association and auditory association. The correlation between visual reception and auditory association might logically be expected to be the lowest value, in that these subtests purport to measure different modalities and different processes, yet the observed correlation of .780 is the third highest value in this submatrix.

A similar evaluation of the intercorrelations between the modality categories for the IAMS (variables 6 to 14) is not appropriate for comparison with the ITPA in that the input-output modalities cannot be assessed independently and therefore the scores on which these correlations are based may reflect either the input, the output or an interaction between the two modalities. Nonetheless, the intercorrelations between certain of these categories with the ITPA subtest scores may provide empirical evidence regarding the extent to which two methods of measuring roughly similar traits (modalities) meet the requirements of the Campbell-Fiske model. Thus, when one examines columns 6 through 14 (IAMS separate continua variables) for the appropriateness of the variable labels in terms of relationships with other similarly named variables, he meets with mixed success. The following variables appear to have relatively clean compositions: 6 (IAMS auditory-vocal), (IAMS auditory-motor), 11 (IAMS visual/auditory-general), and 14 (IAMS visual-general). In particular, 6 seems to be "loaded" with vocal output, 7 with vocal output, 11 with visual input, and 14 with visual input. Variables 8 (IAMS auditory-general), 9 (IAMS visual/auditory-vocal), 10 (IAMS visual/auditory-motor), 12 (IAMS visual-vocal), and 13 (IAMS visual-motor) are basically uninterpretable.

Now that some preliminary observations have been made about the Campbell-

Fiske matrix in Table 3, it is necessary to consider more specific aspects of the Campbell-Fiske interpretative procedure. A first requirement of this method is that different methods of measuring the same traits should correlate more positively than different traits measured by the same method. Because the IAMS categories do not distinguish between input and output modalities, only a rough approximation can be made as to similar traits. Specifically variable 8 (auditory-general) might be considered primarily a measure of the students' facility with items presented orally inasmuch as the output is not modality specific. Variable 14 (visual-general) might be considered primarily a measure of the students' facility with items presented visually for a similar reason. The observed correlation of these two measures is low (.073), as might be expected. It seems reasonable to expect higher correlations between these variables and the ITPA counterparts to demonstrate convergence between methods. The correlation between variable 8 with auditory subtests of the ITPA are observed to be .003 and .009 for auditory reception and visual reception respectively. The correlation between variable 14 with the visual subtests of the ITPA are observed to be .034, -.239 and -.104 for visual reception, visual sequential memory, and visual association respectively. Not only do the correlations lack convergence across methods of measurement (ITPA and IAMS), but there is also lack of logically expected divergence. This lack of convergent-divergent evidence can be explained in a number of ways, not the least of which is in the practical limitation of distinguishing the score variance attributable to modality from the score variance due to subject matter difficulty in the IAMS score categories. In this study it was assumed that content difficulty was insignificantly different for the different modality formats but this may not have been the case. A further difficulty with the IAMS score categories, as used in this study, is the fact that a student's

score for each category was computed as the percent correct of the number of items attempted in each category. Because students progressed through the curriculum at their own pace, there was a large variation in the number of items attempted in each category.

The teacher ratings of the extent of difficulty exhibited when students are required to respond orally (variable 15) or in writing (variable 16) were also obtained. The observed correlation between these two variables is .331. Although this value is not highly positive (barely significant) it does seem to indicate that when a student is perceived by his teacher to have difficulty in one of these expressive modes, he is likely to have difficulty with the other expressive mode. Because these two variables focus on the expressive mode, a comparison cannot be made with any of the 5 ITPA subtest raw scores categories available in this study.

The second main question of this study concerned the practical issue of whether or not "forcing" a modality label on a child (e.g., "he is predominantly an audile learner") and the corresponding assumption that different modality combinations all lie along <u>one</u> continuum, are sound premises. Variables 17-21 embody these two premises, which seem to be the typical assumptions of most individualized prescriptive teaching found in current special education practices. If the two premises are sound, then there should be strong logical relationships deriving between variables 1-16 (which reflect the multi-continua philosophy) and variables 17-21. In particular, these expectations are all based on the specific way in which the forced modality assessments in variables 17-21 were scored ("0" for auditory input or specific vocal response and "1" for visual input or specific written response). For example, among the ITPA variables 1-5 and 17-18, one would expect that if the above two premises of forced-choice modality assessment are correct, then convergent validity should evidence itself as follows: (<u>a</u>) variable 17

should have a strong negative correlation with variable 1 and a strong positive correlation with variable 2; (b) variable 18 should have a strong negative correlation with variable 4 and a strong positive relation with variable 5. Similar sets of predictions can be made within the IAMS variables (6-14 and 19-20), and likewise within the TR variables (15-16 and 21). Thus, there are two hypotheses that can be tested for each of the three types of data.

Using Table 3, one can begin his examination of this second main question by looking at the correlation between the two variables 15 and 16 and variable 20, which represents a forced categorizing of students as to whether they perform better on IAMS items that require oral responses or with items requiring a written response. The scores for variable 20 were determined by collapsing across all IAMS items to form two subsets: those requiring oral responses and those requiring written responses (regardless of the stimulus modality). Each pupil's percent correct score was computed for each subset. If his percent correct for oral response items was greater than for written response items, he was assigned a score of zero for his variable (or a score of one if the reverse was true). Thus, it seems logical to expect a negative correlation between variable 20 and variable 16 because high scores are associated with difficulty in written expression as judged by the teachers. Conversely, a positive correlation would logically be expected between variable 20 and variable 15 because a high score is indicative of difficulty with oral expression as judged by the teachers. The observed values are -.128 and .205, respectively, which are in accord with the direction predicted, though neither value is significant at the .10 level.

Before comparing further intercorrelations between the forced variables (17 to 21) and the continuous variables (1 - 16), it is of interest to compare the intercorrelations among the forced choice variables themselves. If

a child is identified as having an auditory preference, one wants to determine if this preference is consistent across the reception, association and expression processes of communication. The observed correlation between the reception and association processes (where the scores reflect modality preferences) as measured by the ITPA (variables 17 and 18) is .121. The correlation between the reception and expression processes (variables 19 and 20) when measured by the IAMS (where the scores reflect modality preferences) is observed to be -.240. Although a direct comparison of these correlations is not appropriate in that the expression process of the IAMS cannot be equated to the association process of the ITPA. It is nonetheless noteworthy that the opposite direction was obtained for these two coefficients. Although the latter comparison may be suspect, it seems consistent to compare the extent to which variables 17, 19 and 20 measure the same thing. While high positive correlations would logically be expected for these variables in that they represent three methods of measuring essentially the same trait, the observed correlations are: $r_{17,19} = -.057$, $r_{17,21} = .301$ and $r_{19,21} = .052$.

Additional insight on the second main question of this study can be gotten by examining the results for logical expectations on variables 17 (forced ITPA reception), 18 (forced ITPA association), 19 (forced IAMS reception), and 21 (forced teacher rating on reception). For 17, one expects a high negative relationship to 1 (weak support) and a high positive correlation with 2 (strong support). For 18, one wants a high negative correlation with 4 (no support) and a high positive correlation with 5 (strong support). For 19, one expects a high negative correlation with 1 (no support) and a high positive correlation with 2 (weak support). Finally, for 21, one wants a high negative correlation with 1 (weak support) and a high positive correlation with 2 (strong support). It is worth noting that the lack of support usually arises in connection with the predicted <u>high</u> negative correlations.

This circumstance might reflect an artifact of the 0 and 1 forced scoring procedure. In summary, there appears to be only weak to mild support from this data for assuming the combined (forced) continuum is reflective of its component continua. This finding would shed doubt on the common practice in prescriptive-diagnostic teaching practice of trying to "label" a child as basically an "audile learner" or a "visuile learner". However, the small N of this study and methodological limitations do not allow one to make generalizable, conclusive statements at this point.

One over-riding consideration which limits interpretation of this data is the absolute number of significant correlations in Table 3. The critical correlational valve for a two-tailed test of significance at the .10 level with 27 degrees of freedom is .311. If one excludes the principal diagonal self-correlations, as well as the intercorrelations between the 5 ITPA subtests, there are 400 remaining correlations. By chance alone, one would expect 40 of these to be significant at the .10 level. The observed number of significant correlations is 52.

DISCUSSION

This study focused on the aptitude component of ATI measurement. In terms of Bracht's (1970) classification of ATI studies, the ITPA variables are no doubt task-general. On the other hand, the CRM measures from the IAMS are more specific. Bracht (1970) hypothesized that disordinal interactions of his particular interpretation would arise most often with factorially simple personological or aptitude measures. Thus, in terms of the ambiguous findings in the separate continua portion of Table 3, the ITPA measures are for all intents and purposes not appropriate to ATI research with handicapped populations where individualization is of the utmost importance. (Of course, it must be remembered that the personological variable that is being discussed in the present study is modality processing strengths and weaknesses, i.e., the "channel of communication" aspect of the ITPA model). The results of this study do not, however, negate the use of the ITPA in ATI research aimed, for example, at levels of communicative organization (representational or automatic), rather than modality strengths.

Some qualifications of this study must be discussed. First, as stated just above, the ITPA modality assessments are made on the basis of a test model that is related to abstract intellectual tasks rather than realistic school-related tasks (see Proger, 1971). It would have been fairer to the ITPA assessment to have pitted the test against similarly abstract CRM tasks, rather than the highly specific, school-related CRM exercises from the IAMS. But, on the other hand, the ITPA is often taken to have diagnostic implications for highly specific programing in the classroom.[3] Second, the CRM data used here is derived from a preliminary field-test version of the IAMS. Because the CRM tests were still in rough form, several factors lowered their validity. For one thing, several of the IAMS tests had their items arranged in such a manner to allow the student inadvertent information as to what was

being tested; as a result CRM pretest scores on several monitors would be invalidly, unreasonably high (in some cases, almost identical to post-instruction scores!).[4] Further, in certain items, the modality used to assess a specific skill was not appropriate and would best have been omitted. Other contaminating factors of the CRM data could be cited. Nonetheless, because the CRM modality classifications were made on the basis of a composite from many items over several monitors, it was still felt that the CRM data could have some confidence placed in it.

SUMMARY

The main purpose of this study was to assess the extent to which a commoniy used instrument (ITPA) in remedial instruction with handicapped children, relates to task-specific assessments of actual learning. If there is little agreement between the abstract ITPA tasks and the specific IAMS-CRM tasks, then it should be clear that for purposes of making the treatments (which need to be highly specific) maximally effective, the applied instructional programer would do best to use task-specific aptitude measures rather than the ITPA. The results of this study showed in this regard were rather contradictory, showing at times expected relationships and at other times weak relationships. The second issue of this study concerned the questioning of basic implicit assumptions often made when prescribing instructional activities for the handicapped on the basis of modality aptitudes: namely, that a child can be classified along one continuum ranging from "pure" audile learner to "pure" visuile learner. This study yielded some evidence to question this assumption, although the methodological limitations of this study do not allow one to put forth firm conclusions in this regard.

FOOTNOTES

[1]This paper was presented at the 1973 Annual Meeting of the American Educational Research Association, Session 15.24, Division C (Instruction and Learning), February 27, 1973, in the session, "Teaching Strategies for Handicapped." The preparation of this paper was aided by two grants to federal projects for which the Montgomery County Intermediate Unit is the local education agency: (a) Pennsylvania Resources and Information Center for Special Education (ESEA Title III: R-22-H, 48-70-0003-0), and (b) National Regional Resource Center of Pennsylvania (ESEA Titles VI & III: OEG-2-70-0051; 48-1919-SC-699). However, the views contained herein are solely those of the authors and no endorsement on the part of Montgomery County, PRISE, NRRC/P, or the U. S. Office of Education, is to be inferred.

[2]The ITPA measures given in Table 1 are well known and no more need be said here. However, the terminology used in the description for the IAMS in Table 1 needs elaboration. The definitions for the labels used for the nine IAMS modality categories presented in Table 1 are defined below:

I. Reception Categories

A. Auditory: refers to items presented orally.

B. Visual and Auditory: refers to items wherein both the visual and auditory dimensions of the stimulus are task specific, i.e. Point to the letter that has the sound /k/.

C. Visual (Auditory) refers to items wherein the visual processing is content specific and where the auditory component serves to given directions as to what is to be done, i.e. Read this word.

II. Expression Categories

A. Specific Vocal - refers to items requiring a specific vocal response, i.e. What is the sound of this letter.

B. Specific Written: refers to items response, i.e. Write the letter "j".

C. General Vocal or General Motor: refers to items wherein the quality of the response is not critical, i.e. Do these two words rhyme? or Raise your hand when I say a word that rhymes with "hand", or Mark the word that rhymes with "hand".

[3]This is not to imply that the authors of the 1968 edition of the ITPA intended to be used in this task-specific prescriptive fashion, although a recent work of theirs would indeed imply just that (Kirk & Kirk, 1971).

[4]The crucial consideration is the extent of variability within the block of IAMS variables 6-14 in Table 3. The present study would be invalid with regard to the first question of comparing task-general ITPA modality assessments with task-specific IAMS data, if there were very low intercorrelations among the IAMS variables themselves (that is, a reflection of no variability). In this instance, of course, one would treat seriously only the results in Table 3 dealing with ITPA and TR variables under both the separate-continua and forced-choice modality assessment conditions. As one can see from Table 3, however, there are several high as well as low correlations, and thus a large amount of variation is present.

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TABLE 1

SEPARATE CRITERIA USED FOR MODALITY

APTITUDE ASSESSMENT

Criterion Name	Description				
	Representational Level			Automatic Level	
	Reception	Association	Expression	Closure	Sequential Memory
Norm-Referenced Measures					
ITPA #1	Auditory	- - -	- - -	- - -	- - -
ITPA #2	Visual	- - -	- - -	- - -	- - -
ITPA #3	- - -	- - -	- - -	- - -	Visual
ITPA #4	- - -	Auditory	- - -	- - -	- - -
ITPA #5	- - -	Visual	- - -	- - -	- - -
Criterion-Referenced Measures					
IAMS #1	Auditory	- - -	Specific Vocal	- - -	- - -
IAMS #2	Auditory	- - -	General Vocal or Gen. Motor	- - -	- - -
IAMS #3	Auditory	- - -	Specific Written	- - -	- - -
IAMS #4	Visual and Auditory	- - -	Specific Vocal	- - -	- - -
IAMS #5	Visual and Auditory	- - -	General Vocal or Gen. Motor	- - -	- - -
IAMS #6	Visual and Auditory	- - -	Specific Written	- - -	- - -
IAMS #7	Visual (Auditory)	- - -	Specific Vocal	- - -	- - -
IAMS #8	Visual (Auditory)	- - -	General Vocal or Gen. Motor	- - -	- - -
IAMS #9	Visual (Auditory)	- - -	Specific Written	- - -	- - -
Teacher Ratings					
TR #1	- - -	- - -	Oral	- - -	- - -
TR #2	- - -	- - -	Written	- - -	- - -

TABLE 2

COMBINED CRITERIA USED FOR MODALITY

APTITUDE ASSESSMENT

Criterion Name	Representational Level Description		
	Reception	Association	Expression
Norm-Referenced Measures			
ITPA - A	ITPA-1 vs. ITPA-2	- - -	- - -
ITPA - B	- - -	ITPA-4 vs. ITPA-5	- - -
Criterion-Referenced Measures			
IAMS - A	IAMS-2 vs. IAMS -8	- - -	- - -
IAMS - B	- - -	- - -	IAMS-1 + IAMS-4 + IAMS-7 vs. IAMS-3 + IAMS-6 + IAMS-9
Teacher Rating			
TR-3	Oral vs. Visual	- - -	- - -

TABLE 3

CAMPBELL-FISKE MATRIX OF SENSORY MODALITY

ASSESSMENT INTERCORRELATIONS

Variable Name and Number	Variable Number 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
1. ITPA-1	1.00	629	416	705	634	285	127	003	350	048	082	094	224	142	333	153	-022	171	051	-173	-027
2. ITPA-2		1.00	613	780	877	302	266	098	214	204	075	023	051	034	159	011	532	390	012	-000	305
3. ITPA-3			1.00	677	652	164	082	069	075	048	075	332	007	239	014	280	303	172	-146	-031	072
4. ITPA-4				1.00	884	202	316	009	249	184	209	036	124	199	151	001	337	062	-299	047	213
5. ITPA-5					1.00	215	304	048	244	191	135	046	070	104	162	013	402	436	-197	124	140
6. IAMS-1						1.00	191	050	672	161	056	408	013	273	219	444	286	252	163	-501	-138
7. IAMS-2							1.00	182	370	236	054	349	007	098	254	110	199	094	-068	284	201
8. IAMS-3								1.00	277	151	016	187	192	073	087	125	-047	111	-157	150	227
9. IAMS-4									1.00	116	335	575	000	506	-006	233	-028	268	317	-212	-104
10. IAMS-5										1.00	-039	-073	340	-131	-182	-241	239	133	-121	081	249
11. IAMS-6											1.00	394	188	478	-009	-130	-086	141	642	-152	-065
12. IAMS-7												1.00	-232	455	117	109	-108	-024	281	-454	-010
13. IAMS-8													1.00	191	-065	-358	186	402	162	187	026
14. IAMS-9														1.00	064	-070	-007	223	778	-208	103
15. TR-1															1.00	331	-110	044	-119	195	205
16. TR-2																1.00	-234	-142	-078	146	-128
17. ITPA-A																	1.00	121	-057	-031	301
18. ITPA-B																		1.00	275	119	-170
19. IAMS-A																			1.00	-240	052
20. IAMS-B																				1.00	224
21. TR-3																					1.00

NOTE: -- For a complete description of the 21 variables, see Table 1 and Table 2. All decimal points have been omitted. Variables 1-5 and 17-18 are norm-referenced (standardized) measures, variables 6-14 and 19-20 are criterion-referenced, and variables 15-16 and 21 are teacher ratings.